Project 2

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Vaccination_Tracking_System

A database is designed and implemented for keeping track of Covid-19 vaccination. EER is designed based on the requirements and the database tables are implemented according to the EER diagram and then mapped it to relational database schema.

This system can show what types of vaccines has been procured from which manufacturers and distributed to which unit/State. The database also has tables with names doses_administered, doses_datewise, fedrel_data, manufacturers and tot_doses_distributed.

Additional Requirements Required:

- Regarding the vaccine it is not clearly mentioned that one person can get vaccine through only one vaccination phase, if not restricted so, every person will be able to receives a greater number of vaccines.

Assumptions:

In this system the manufacturer will distribute to the federal government and to different units which is state and further distributed two local bodies. The federal government distributes the vaccines procured from the manufacturers to different units and further distributed to state and local bodies.

A single person is assumed to confine to a single vaccination phase(i.e., 1A(Healthcare-Tier 1), 1A(Healthcare-Tier2), (1A-long term care-assisted living residents)…etc)

EER description:

According to the requirements the EER diagram is designed.

The EER diagram has as 5 main entities they are manufacturer, vaccine, federal government, unit, person.
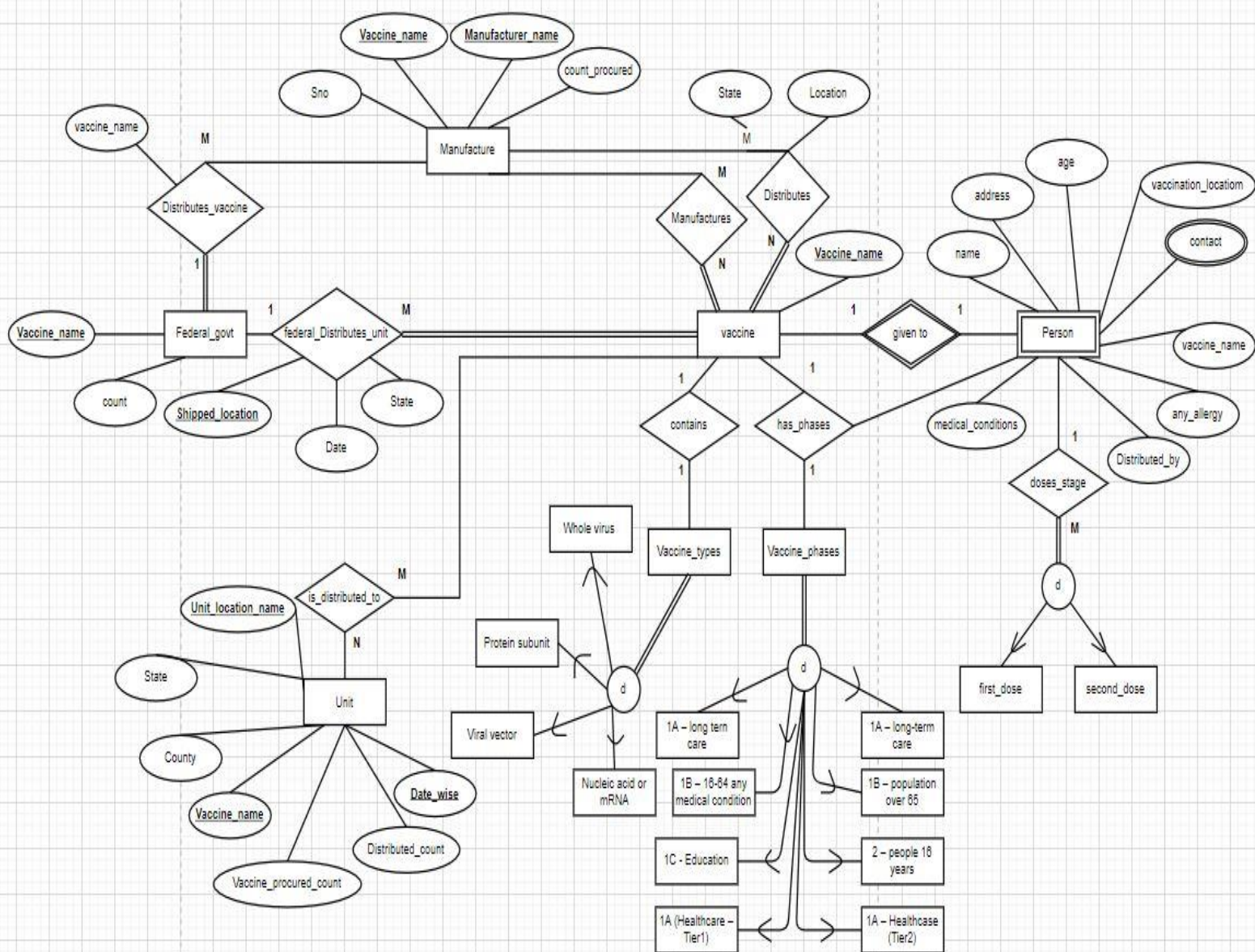
Entities:

Manufacturer:

- The manufacturer entity has sno, manufacturer_name, vaccine_name, distributed_to, count_distributed attributes which describes the complete details of a manufacturer and the vaccine.
- In this the manufacturer_name, vaccine_name and distributed_to are made as primary keys
- The manufacturer manufactures the vaccine and distributes the vaccine to federal data and to the unit.

Federal_ data:

- The vaccines are distributed from the manufacturer to the federal government which is further distributed to the unit.
- This federal_data entity has vaccine_name, shipped_to_location, count_procured, manufacturer_name attributes.
- In this the vaccine_name and shipped_to_location is made as primary keys and the manufacturer_ name is made foreign key references from manufacturer's table.

Vaccine:

- The vaccine is obtained from the manufacturers and distributed from manufacturers and federal data to unit
- The vaccine contains vaccine types which are further divided into four types and it has 8 different phases and the vaccines are given to the person. The vaccine_name is a primary key of this entity.

Person:

- The person takes vaccines depending on the types and doses. It has name, address, age, contact, vaccination_ location, vaccine_name, any _allergy, distributed _by, medical_ conditions, phases and doses_stages which is further subgrouped into first_dose and second_dose where contact is multi-valued attribute.
- This entity is a weak entity which is represented by double rectangle and the relationship between vaccine and person is a weak relationship which is represented by a double rhombus. since this entity does not have any primary key it is known as week entity.

Unit:

- The vaccines from the manufacturer and the federal government is distributed to unit
- Unit has name an UID as its attributes. this unit Can be state or a local body like csv Walgreens etc.

Relationships:

Distributes_vaccine:

- This relationship is between manufacturer and federal government.
- Over here, the manufacturer distributes vaccines to federal government, the cardinality ration of this relation is (M:1) many to one relation because many manufacturers can distribute vaccine to a single unit called federal government.

- This relationship carries attributes like vaccine_name with it.

Fedrel_distributes_unit:

- This relationship is between vaccine and fedrel government.
- Over here, federal government distributes vaccine, the cardinality ratio of the relation is (1:M) one to many relation because there is only federal government that distributes many vaccines.
- This relationship has attributes shipped_location, Date, State.

Distributes:

- This relationship is between manufacturer and vaccine.
- Over here, the manufacturer distributes the vaccine, the cardinality ratio of the relation is (M:N) many to many as many manufacturers distributes many kinds of vaccines.
- This relationship has attributes location and state.

Manufactures:

- This relationship is between manufacturer and vaccine.
- Over here, the manufacturer manufacturers different vaccine, the cardinality ratio of the relation is (M:N) many to many as many manufacturers manufactures many kinds of vaccines.

Contains:

- This relationship is between vaccine and vaccine types.
- Over here, each vaccine of type is defined, the cardinality ratio of relation is (1:1) one to one as one, each vaccine can be of only one vaccine types

Has_phases:

- This relationship is between vaccine and vaccine phases.
- Over here, vaccine given in different phases is determined, the cardinality ratio of relation is (1:1) one to one as one, each vaccine can be used through only one vaccine phases.

Given to:

- This relationship is between vaccine and person.
- Over here, each vaccine is given to only one person, the cardinality ratio of relation is (1:1) one to one as one, each vaccine can be given to only one person.
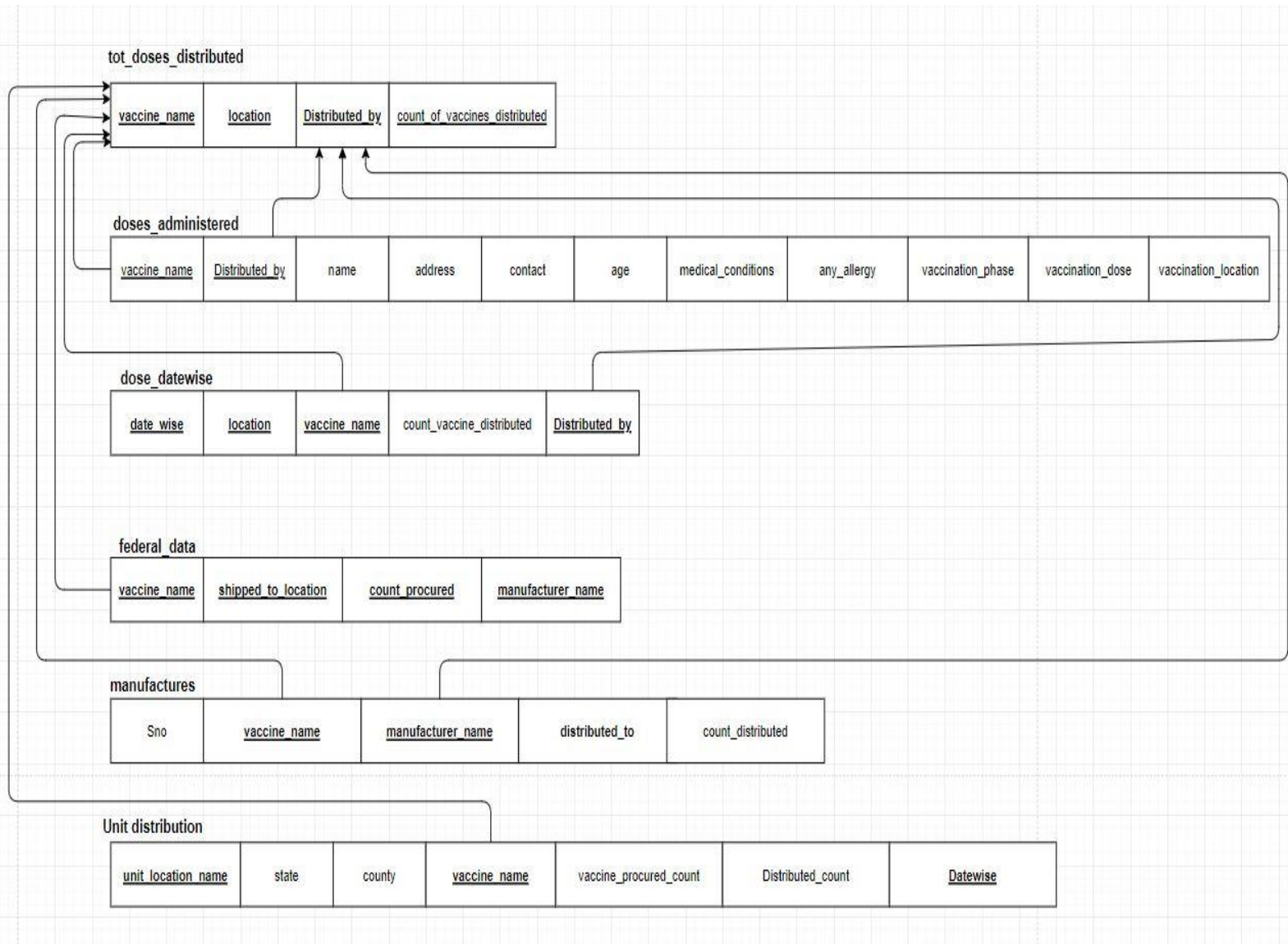
Doses_stage:

- This relationship is between person and vaccination dose phase.
- Over here, each person gets vaccine in a different phase, the cardinality ratio of relation is (1:M) one to many as each person gets vaccine in different phases.

Is_distributed_to:

- This relationship is between unit and vaccine.
- Over here, different vaccines are distributed to different units, the cardinality ratio of relation is (M:N) many to many as many vaccines are distributed to many units.

Above EER model is mapped to relational schema and the resultant schema is as below.

Relational Scheme:

tot_doses_distributed

vaccine_name	location	Distributed_by	count_of_vaccines_distributed

doses_administered

vaccine_name	Distributed_by	name	address	contact	age	medical_conditions	any_allergy	vaccination_phase	vaccination_dose	vaccination_location

dose_datewise

date_wise	location	vaccine_name	count_vaccine_distributed	Distributed_by

federal_data

vaccine_name	shipped_to_location	count_procured	manufacturer_name

manufactures

Sno	vaccine_name	manufacturer_name	distributed_to	count_distributed

Unit distribution

unit_location_name	state	county	vaccine_name	vaccine_procured_count	Distributed_count	Datewise

ER-to-Relational Mapping:

1)Mapping of Regular Entity Types:

- There are 4 main regular entity according to the EER diagram Manufacture, Federal_govt, vaccine unit. The keys in the EER diagram becomes the primary key in the relational schema.

2)Mapping of Weak Entity Types:

- According to the EER diagram there is a one weak entity which is person which does not contain any primary key but contains a foreign key

3)Mapping of binary 1:1 relation types:

- There is a 1:1 relation mapping between vaccine and person which is a weak relationship
- This binary relation is also seen in between vaccine and vaccine_types
- Between vaccine and vaccine_phases also there is 1:1 binary relation

4) Mapping of Binary 1:M Relationship Types:

- This relation is between manufacturer and federal govt this is represented using foreign key in the relational schema diagram
- It is also between federal govt and vaccine where vaccine_name is a foreign key in both

5) Mapping of Binary M: N Relationship Types:

- This M:N relation is between manufacturer and vaccine where a foreign key is established
- Vaccine and unit also has this M:N relation

6) Mapping of Multivalued Types:

- The EER diagram has a multivalued attribute that is contact since it has more than one value

7) Mapping of Subgroups:

- The vaccine_types and vaccine_phases has subgroups which are divided into various types
- The dose_stage is also subgrouped into 2 types first_dose and second_dose

SQL Database Creation Statements:

create database vaccination_tracking_system;

#Manufacturers Table

```
create table manufacturers(
sno int(11),
manufacturer_name Varchar(40),
vaccine_name Varchar(40),
distributed_to Varchar(40),
Count_distributed int(11),
primary key(manufacturer_name,vaccine_name,distributed_to)
);
CREATE INDEX vaccine_index
ON manufacturers(vaccine_name);
```

#Federal_Table

```
create table federal_data(
vaccine_name Varchar(40),
Shipped_to_location Varchar(40),
Count_procured int(11),
manufacturer_name Varchar(40),
primary key(vaccine_name,Shipped_to_location),
FOREIGN KEY (vaccine_name) REFERENCES manufacturers(vaccine_name),
FOREIGN KEY (manufacturer_name) REFERENCES manufacturers(manufacturer_name)
```

```
);
```

#tot_doses_distributed

```
create table tot_doses_distributed(
vaccine_name Varchar(40),
shipped_to_location Varchar(40),
Distributed_by Varchar(40),
count_of_vaccination_distributed int(11),
Distributed_date date,
primary key(vaccine_name,shipped_to_location,Distributed_by),
FOREIGN KEY (vaccine_name) REFERENCES manufacturers(vaccine_name)
);
CREATE INDEX distributed_index_doses
ON tot_doses_distributed(Distributed_by);
```

#doses_administered

```
create table doses_administered(
vaccine_name Varchar(40),
Distributed_by Varchar(40),
fullname Varchar(40),
address Varchar(40),
contact Varchar(40),
age int(11),
medical_conditions Varchar(40),
```

```sql
any_allergy Varchar(40),

vaccination_phase Varchar(40),

vaccination_dose int(11),

FOREIGN KEY (vaccine_name) REFERENCES manufacturers(vaccine_name),

FOREIGN KEY (Distributed_by) REFERENCES tot_doses_distributed(Distributed_by)

);


#doses_datewise


create table doses_datewise(

Date_wise DATE NOT NULL,

location Varchar(40),

vaccine_name Varchar(40),

count_vaccine_distributed int(11),

Distributed_by Varchar(40),

primary key(Date_wise,location,vaccine_name,Distributed_by),

FOREIGN KEY (vaccine_name) REFERENCES manufacturers(vaccine_name),

FOREIGN KEY (Distributed_by) REFERENCES tot_doses_distributed(Distributed_by)

);



#unit_wise_distribution


create table unit_distribution(

unit_location_name varchar(40),

state Varchar(40),

county Varchar(40),

vaccine_name Varchar(40),
```

```
vaccine_procured_count Varchar(40),

Distributed_count Varchar(40),

Date_wise date,

primary key(unit_location_name,vaccine_name,Date_wise),

FOREIGN KEY (vaccine_name) REFERENCES manufacturers(vaccine_name)

);
```